The Price of Capital Goods: An Investment Driver under Threat?

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For decades in both AEs and EMs, real investment rates increased as the relative price of capital goods declined.

Real Investment Rate and Changes in Relative Price of Machinery and Equipment

1. Advanced Economies

2. Emerging Market and Developing Economies

Sources: Penn World Table 9.0; IMF, *World Economic Outlook*; and IMF staff calculations.
But further decline in the relative price of capital goods may be under threat.

Possible headwinds from:

- Rising trade tensions and higher trade costs
- Slowdown in global trade / GVC maturation
- Sluggish productivity growth in many AEs

Sources: Haver Analytics, and IMF staff calculations.
Note: Countries include Australia, Canada, Germany, Hong Kong SAR, Italy, Norway, Portugal, Spain, United Kingdom, United States.
Drivers of declining relative price of capital

Trade was a crucial contributor to the decline of the relative price of capital goods, in addition to technological progress, of course.

Macro implications of declining relative price of capital

The relative price of capital goods has been an important overlooked driver of investment.
Real investment and relative price of capital goods


- Low-income countries have higher relative price of capital
- Lower relative price of capital leads to more investment in the cross-section of countries

Factors that affect relative price of capital goods

The relative price of tradable investment goods has declined across both AEs and EMDEs

Relative price of different types of investment over time
(Percent change relative to 1990)

Sources: Penn World Table 9.0, and IMF staff calculations.
Notes: Relative prices are obtained by dividing deflators for specific types of investment by the price of consumption. The solid line plots year fixed effects from a regression that also includes country fixed effects to account for entry and exit during the sample and level differences in relative prices.
The relative price declines of Machinery and Equipment are driven by IT and communications equipment.

Relative price of different types of investment over time
(Percent change relative to 1990)

Sources: EU and World KLEMS, and IMF staff calculations.
Notes: Relative prices are obtained by dividing deflators for specific types of investment by the price of consumption. The solid line plots year fixed effects from a regression that also includes country fixed effects to account for entry and exit during the sample and level differences in relative prices.
EMDEs still face higher prices of machinery and equipment, especially relative to the price of consumption.

Sources: International Comparison Program (ICP) 2011, and IMF staff calculations.

Note: The absolute price of Machinery and Equipment is the price level of Machinery & Equipment, derived by the ICP using a similar basket of products across countries, relative to its US level. The relative price is the price of Machinery & Equipment relative to the price of consumption.
Research design: Drivers of $\frac{P_I}{P_C}$

**Across Countries**
Why are relative prices of tradable capital goods higher in EMDEs? Revisit literature.
- Exporter prices
- Trade costs
- Relative productivity

**Over Time**
How much of the decline in the relative price of capital goods can be attributed to:
- Trade integration?
- Relative productivity?

\[
\frac{P_I}{P_C} = f\left(\frac{a_T}{a_{NT}}, P_I^*, \text{trade costs}\right)
\]

Domestically produced
- Prices charged by exporters
- Relative Productivity

Imported
- Transportation, tariffs, etc.
Drivers across countries
There is no evidence that EMDEs are charged higher prices by exporters

Index of prices (unit values, $P^*$) of capital goods charged by 5 key exporters in 2011

Source: IMF staff calculations. Five major exporters are: China, U.S., Germany, Japan and France.
The higher relative investment prices in EMDEs reflect higher trade costs and lower efficiency in producing capital goods.

Cross-country variation in relative prices explained by relative productivity and trade costs, 2011 ICP (Percent)

Source: IMF staff calculation.
DRIVERS OVER TIME
The fall in the relative price of capital goods was driven by rising trade integration and faster productivity growth.

Decomposition of changes in relative prices of investment from 2000 to 2011

Data: WIOD, 33 sectors 40 countries, 1995-2011

Use import penetration to proxy for trade integration. Use import tariffs to instrument for import penetration.

Approach:
1. Estimate the elasticity of relative sectoral producer prices with respect to trade integration and relative productivity.
2. Estimate the elasticity of relative productivity with respect to relative import penetration.
3. Use estimated elasticities and changes in import penetration and relative productivity, to decompose the observed change in relative producer prices of capital goods.

Source: IMF staff calculations.
MACRO IMPLICATIONS
Historically, the relative price of capital has been a key driver of real investment rates

Average contributions to changes in M&E investment rates from 1990-94 to 2010-14
(Percent)

Source: IMF staff calculations. Policy controls include: real interest rates, credit-to-GDP ratio, capital account openness, trade openness, commodity terms of trade, institutional quality, infrastructure (roads quality).
Conclusion: An investment driver is under threat

Conclusions:
- Trade integration and relative productivity growth both contributed to declining relative price of capital goods
- Falling relative price of capital goods provided an important boost to real investment rates
- Future decline in the relative price of investment is under threat due to trade tensions and sluggish productivity growth

Policy implications:
- AEs: Avoid introducing new trade barriers
- EMDEs: Where possible, further reduce trade barriers
- All: Support innovation that can fuel further productivity gains in the capital goods producing sector